

between 1970 and 1980, especially in Rankin County, which more than doubled its percentage. The urban proportions have remained constant through the 1980's. Table EIS-9 summarizes pertinent statistics.

TABLE EIS-9  
COUNTY URBAN POPULATIONS, 1990

County	Urban Residents	Percent of Total	1980 Percent
Hinds	220,227	86.6	86.8
Rankin	48,296	55.1	56.3
Total	268,523	78.5	80.2

SOURCE: U.S. Census of Population: 1980 and 1990.

73. Between 1980 and 1990, the number of individuals in the labor force grew from 164,342 to 180,536, a gain of 9.85 percent. Rankin County registered the highest growth, 52 percent, compared to 3.45 percent increase in Hinds County. Table EIS-10 shows the 1979 distribution of place-of-work employment by major industry group for the two counties. Because of the predominance of Jackson, the trade services sectors constitute 53 percent of area employment, followed by government at 24 percent, manufacturing at 10 percent, and all other sectors at 12 percent.

TABLE EIS-10  
PLACE-OF-WORK EMPLOYMENT, 1990

County	Total	Trade and Services	Government	Manufacturing	Other
Hinds	147,476	80,021	35,835	13,790	17,830
Rankin	33,060	14,910	7,877	5,593	4,680
Total	180,536	94,931	43,712	19,383	22,510

SOURCE: Mississippi Employment Security Commission.

74. With the economic growth in the area, great changes occurred in the income statistics of the two counties. The 1990 per capita income figures for each county showed increases in excess of 70 percent over the 1980 numbers. Rankin County's gain was 80.5 percent, from \$8,180 to \$14,765, with Hinds County increasing 72 percent from \$9,151 to \$15,753.

## LAND USE

75. In 1985, over 23 percent of the 38,300-acre study area flood plain was devoted to urban development. Since that time, urban development, primarily residential and commercial development, has continued within the flood plain.

## SIGNIFICANT RESOURCES

76. Significant resources are recognized by institutional, public, or technical criteria (Table EIS-11). Public recognition can include controversy, support, or opposition concerning a resource. Technical recognition is based on scientific knowledge or judgment or resource characteristics. The significance may be recognized by more than one criterion. For example, the significance of bottom-land hardwood forests is recognized by Public Law 99-662 (requires in-kind mitigation to the extent possible), local communities for the consumptive and nonconsumptive recreational value, and the scientific community for the functional wetland value.

77. Significant natural resources in the project area also include the Pearl River and its flood plain. The dynamics of the Pearl River and its flood plain, which is typical of many coastal plain rivers of the southeastern United States, supports a highly diverse and complex floral and faunal assemblage which is dependent upon meanders, natural cutoffs, oxbow lakes, overflow channels, old river runs, and an extensively forested flood plain. Specific significant resources include waterfowl, bottom-land hardwoods, wetlands, threatened and endangered species, out-of-door recreational activities, and cultural resources.

## PRIME FARMLANDS

78. Pursuant to the Farmland Protection Policy Act, a Farmland Impact Rating form for the proposed levee and borrow construction areas was sent to the Hinds County Conservation District of SCS.

## WATERFOWL RESOURCES

79. Due to the highly urbanized nature of the Jackson metropolitan area, this part of the Pearl River Basin is not a major waterfowl area. However, the flood plain forests are used year-round by wood ducks and to a lesser extent by migratory waterfowl. Many of the oxbow lakes, old river channels, and other frequently flooded areas within the flood plain provide good brood-rearing habitat for wood ducks.

## TERRESTRIAL RESOURCES

80. Wildlife resources within the Pearl River Basin are dependent upon the diverse composition of the flood plain forest. Habitat type is the single-most important determinant of wildlife species composition. Bottom-land hardwoods comprise the largest habitat type in the flood plain forests in the

TABLE EIS-11  
INSTITUTIONAL RECOGNITION OF SIGNIFICANT RESOURCES  
JACKSON METROPOLITAN AREA

Public Laws

Anadromous Fish Conservation Act, Public Law 89-304; 16 U.S.C. 757. et seq.

Antiquities Act of 1906, Public Law 59-209; 16 U.S.C. 431, et seq.

Archeological and Historic Preservation Act, Public Law 93-291, 16 U.S.C. 469, et seq. (also known as the Reservoir Salvage Act of 1960, as amended; Public Law 91-291, as amended; the Moss-Bennett Act; and the Preservation of Historic and Archeological Data Act of 1974).

Bald Eagle Act; 16 U.S.C. 668.

Clean Air Act, as amended, Public Law 91-604, 42 U.S.C. 1857h-7, et seq.

Clean Water Act, Public Law 92-500; 33 U.S.C. 1251, et seq. (also known as the Federal Water Pollution Control Act; and Public Law 92-500, as amended).

Coastal Zone Management Act of 1972, as amended, Public Law 92-583; 16 U.S.C. 1451, et seq.

Endangered Species Act of 1973, as amended, Public Law 93-205; 16 U.S.C. 1531, et seq.

Estuary Protection Act, Public Law 90-454; 16 U.S.C. 1221, et seq.

Farmland Protection Policy Act.

Federal Environmental Pesticide Control Act, Public Law 92-516; 7 U.S.C. 136.

Federal Water Project Recreation Act, as amended, Public Law 89-72; 16 U.S.C. 460-1(12), et seq.

Fish and Wildlife Coordination Act of 1958, as amended, Public Law 89-72; 16 U.S.C. 661, et seq. (also known as the Coordination Act).

Food Security Act of 1985, Public Law 99-198.

Historic Sites of 1935, as amended, Public Law 74-292; 16 U.S.C. 461, et seq.

Land and Water Conservation Fund Act, Public Law 88-578; 16 U.S.C. 460/-046/-11, et seq.

TABLE EIS-11 (Cont)

Public Laws (Cont)

Marine Mammal Protection Act of 1972, Public Law 92-522; 16 U.S.C. 1361, et seq.

Migratory Bird Conservation Act of 1928; 16 U.S.C. 715.

Migratory Bird Treaty Act of 1918; 16 U.S.C. 703, et Seq.

National Environmental Policy Act of 1969, as amended, Public Law 91-190; 42 U.S.C. 4321, et seq. (also known as NEPA).

National Historic Preservation Act of 1966, as amended, Public Law 89-665; 16 U.S.C. 470a, et seq.

Native American Religious Freedom Act, Public Law 95-341; 42 U.S.C. 1996, et seq.

Resource Conservation and Recovery Act of 1976, Public Law 94-580; 7 U.S.C. 1010, et seq.

Rivers and Harbors Act of 1899, 33 U.S.C. 403, et seq. (also known as the Refuge Act of 1899).

Submerged Lands Act of 1953, Public Law 82-3167; 43 U.S.C. 1301, et seq.

Surface Mining Control and Reclamation Act of 1977, Public Law 95-89; 30 U.S.C. 1201, et seq.

Toxic Substances Control Act, Public Law 94-649; U.S.C. 2601 et seq.

Watershed Protection and Flood Prevention Act, as amended, Public Law 83-566 16 U.S.C. 1001, et seq.

Wild and Scenic Rivers Act, as amended, Public Law 90-542; 16 U.S.C. 1271, et seq.

TABLE EIS-11 (Cont)

Executive Orders

Executive Order 11593, Protection and Enhancement of the Cultural Environment, May 13, 1979 (36 FR 8921; May 15, 1971).

Executive Order 11988, Floodplain Management, May 24, 1977 (42 FR 26951; May 25, 1977).

Executive Order 11990, Protection of Wetlands, May 24, 1977 (42 FR 26961; May 25, 1977).

Executive Order 11514, Protection and Enhancement of Environmental Quality, March 5, 1970, as amended by Executive Order 11991, May 24, 1977.

Executive Order 12088, Federal Compliance with Pollution Control Standards, October 13, 1978.

Other Federal Policies

Council on Environmental Quality Memorandum of August 11, 1980: Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing the National Environmental Policy Act.

Council on Environmental Quality Memorandum of August 10, 1980: Interagency Consultation to Avoid or Mitigate Adverse Effects on Rivers in the Nationwide Inventory.

Migratory Bird Treaties and Other International Agreements Listed in the Endangered Species Act of 1973, as amended, Section 2(a)(4).

study area and are extremely productive wildlife areas. Of the 490 wildlife species occurring within the Pearl River Basin, a high percentage utilize bottom-land hardwoods as primary habitat for reproduction and/or feeding during all or a portion of the year. Bottom-land hardwoods interspersed with cypress-tupelo/oxbow associations add to the diversity and productivity of the flood plain ecosystem. Major areas of the flood plain above and below Jackson are composed of these habitats and provide much of the potential wildlife-oriented recreational use enjoyed by the residents of the Basin. However, the city of Jackson and its associated development have altered much of the riparian habitat. Construction of roads, levees, bridges, and urban development has served to lessen the quantity and quality of the adjacent habitat, making it less suitable for optimum use by wildlife.

#### WETLAND RESOURCES

81. In addition to their widely recognized wildlife value, wetlands provide short- and long-term water storage, water velocity reduction and sediment detention, nutrient removal, prevention of shoreline erosion, and export of organic carbon to downstream aquatic ecosystems. The project area contains 16,479 acres of bottom-land hardwood wetlands and 1,046 acres of cypress-tupelo gum. Comparatively, these types of wetlands exhibit a greater capacity for performing wetlands functions than agricultural/open land wetlands.

#### AQUATIC RESOURCES

82. The Pearl River and its tributaries support a diverse fish population. This diversity depends to a great extent upon the varied aquatic habitats present and the relatively clean condition of the river. The river in this region of the Basin supports a varied sport fish assemblage including largemouth and spotted bass, bluegill, and redear sunfishes, crappie, and various catfishes. A limited fishery for striped bass also exists in the Pearl River below Ross Barnett Reservoir. Forage fish diversity is also high, and many species of minnow and darters utilize the varied habitats of the Pearl River and serve as a ready food source for other species.

#### THREATENED AND ENDANGERED SPECIES

83. Site records indicate that the endangered bald eagle (Haliaeetus leucocephalus) winters in the area around Ross Barnett Reservoir. The threatened ringed sawback turtle (Graptemys oculifera) occurs in the Pearl River throughout the project area. The American alligator (Alligator mississippiensis) is also commonly found throughout the river and adjacent water bodies.

#### CULTURAL RESOURCES

84. A survey was conducted in 1992 to determine National Register of Historic Places (NRHP) status of prehistoric and historic sites within the project area. Three previously recorded sites were also surveyed to determine

possible impacts due to construction. A total of 41 previously unrecorded archeological sites were located and evaluated. Additional unrecorded sites are likely to occur on terrain adjacent to secondary tributaries along abandoned river channels. Most sites were found not eligible for NRHP. However, two prehistoric sites were determined eligible for inclusion in the NRHP.

#### WATER QUALITY

85. The portion of the Pearl River between the Ross Barnett Reservoir Dam and the raw water intake structure at RM 290.6 is classified by the Mississippi Bureau of Pollution Control (MBPC) for public water supply. Between the intake structure and Byram, the Pearl River is classified for fish and wildlife.

86. A search of EPA's STORET data base identified two water quality monitoring stations within the project area. The stations, which are monitored by MBPC, are located at the downstream side of the Ross Barnett Reservoir (21MSWQ 02485601) and at Byram (21MSWQ 02486500). Data available at the reservoir are limited to the period of 1974 to 1989. Data reported near Byram were between 1975 and 1992. Both sets of data are displayed in Table EIS-12. Summary statistics on heavy metal concentrations are depicted in Table EIS-13. Data on heavy metals are from the station at Byram only.

87. MBPC reports in their 1992 "Water Quality Assessment" that the Pearl River from below the reservoir to the water intake structure "partially supports its public water supply classification and is increasingly threatened by urban runoff and industrial point sources." Water quality data reported at the reservoir indicate that total phosphorous and fecal coliform exceed state benchmark levels. Total phosphorous levels reported at this station ranged from 0.09 to 0.23 milligram per liter (mg/l). The mean concentration, 0.20 mg/l, exceeds the state benchmark of 0.15 mg/l. Fecal coliform concentrations ranged from 1 to 6,000 colonies per 100 milliliters (mL). The state criteria for drinking water supplies are not to exceed 400 colonies per 100 mL. The 75th percentile range was 146 colonies per 100 mL indicating that the states criteria are exceeded less than 25 percent of the time.

88. MBPC reported that the section of the stream below the water intake to above the Jackson wastewater treatment plant near RM 281 "partially supports its fish and wildlife classification due to urban runoff." The Pearl River at Byram is impacted by the city of Jackson's wastewater treatment plant and urban runoff which results in its supporting the recreation classification.

89. Water quality data reported near Byram indicate that total phosphorous, total kjeldahl nitrogen and fecal coliforms exceed state benchmark levels. Total phosphorous levels ranged from 0.17 to 0.54 mg/l. The 25th percentile



TABLE EIS-12  
WATER QUALITY DATA

Parameter	Number of Samples	Mean	25% a/	Median	75% b/	Criteria
Pearl River at Ross Barnett Reservoir Station 21NSWQ 02485601						
Temperature (°C)	109	18.9	12	19.8	27	<32.2
Conductivity (umhos/cm)						<500
pH	107	6.6	6.2	6.6	7.0	(6-8.5)
Dissolved Oxygen (mg/l)						>4
Turbidity (NTU)	15	26	23	29	32	
Total Suspended Solids (mg/l)	110	12.9	7	11	16	<1,000
Total Solids (mg/l)						
Total Phosphorous (mg/l)	92	0.20	0.09	0.13	0.23	<0.15
PO4 (mg/l)	16	0.20	0.04	0.07	0.18	
Nitrate (mg/l)	90	0.17	0.04	0.1	0.17	<1
TKN (mg/l)	109	0.91	0.67	0.80	1.10	<1
Ammonia (mg/l)	17	0.27	0.11	0.22	0.41	
Fecal Coliform (#/100 mL)	102	495	10	30	146	<400
Pearl River Near Byram, Mississippi Station 21NSWQ 02486500						
Temperature (°C)	306	22.3	19.5	25.5	27	<32.2
Conductivity (umhos/cm)	186	120	75	140	160	<500
pH	191	6.4	6.1	6.5	6.8	(6-8.5)
Dissolved Oxygen (mg/l)	179	5.8	4.2	6.1	6.4	<4
Turbidity (NTU)	48	42	26	35	45	
Total Suspended Solids (mg/l)	134	38	19	27	45	<1,000
Total Solids (mg/l)	9	135	105	120	138	
Total Phosphorous (mg/l)	128	0.41	0.17	0.28	0.54	<0.15
PO4 (mg/l)	31	0.285	0.045	0.13	0.36	
Nitrate (mg/l)	127	0.301	0.07	0.18	0.42	<1
TKN (mg/l)	151	1.419	0.9	1.28	1.8	<1
Ammonia (mg/l)	45	0.424	0.08	0.34	0.625	
Fecal Coliform (#/100 mL)	105	1,377	57	170	1,375	<400

a/ Exceeds state benchmarks standards 75 percent of the time.

b/ Exceeds state benchmarks standards 25 percent of the time.



TABLE EIS-13  
SUMMARY STATISTICS OF HEAVY METALS  
(Parts per Billion ( $\mu\text{g/l}$ ))

Constituent	Mean	Minimum	Maximum	Action Level <sup>a/</sup>	Period
Arsenic	3.55	9.00	51.0	190.0	1991-1992
Cadmium	2.82	0.03	11.0	0.66	1976-1992
Chromium	0.82	0.10	1.0	120.0	1976-1992
Copper	4.20	0.10	13.0	6.5	1976-1992
Lead	8.20	0.50	23.0	1.3	1976-1992
Mercury	0.80	0.0002	1.0	0.012	1976-1992
Manganese	137.50	0.20	238.0	NS	1976-1992
Nickel	3.23	0.20	5.0	88.0	1976-1992
Zinc	8.00	0.02	10.0	59.0	1976-1992
Aluminum	332.25	207.00	510.0	NS	1991-1992

<sup>a/</sup> Action level refers to EPA Freshwater Chronic Criteria.

for total phosphorous was 0.17 mg/l which indicates that phosphorous exceeds the state benchmark of 0.15 mg/l over 75 percent of the time. Total kjeldahl nitrogen ranged from 0.9 to 1.8 mg/l. Total kjeldahl nitrogen exceeded the state benchmark of 1 mg/l over 50 percent of the time. Fecal coliform concentrations ranged from 7 to 20,000 colonies per 100 mL. Fecal coliform concentrations exceeded the drinking water supply criteria over 75 percent of the time.

90. Of the 10 metals reported in Table EIS-13, the Mississippi Department of Environmental Quality has not established standards for two (manganese and aluminum). Two of the remaining metals, arsenic and mercury, exceeded the reported human health standard for concentration in water and organisms. Mean arsenic concentration during the 1991-1992 sampling period was 3.55 microgram per liter ( $\mu\text{g/l}$ ) and mean mercury concentration from 1976 to 1992 was 0.80 ( $\mu\text{g/l}$ ). State standards for arsenic and mercury are 0.0175 and 0.151  $\mu\text{g/l}$ , respectively. In addition to the reported concentrations of the various heavy metals, low levels of DDT have been found in fish tissue samples.

#### AIR QUALITY

91. Air quality for the entire State of Mississippi is considered good. The Jackson area meets air quality standards for all pollutants. The Mississippi ambient air quality standards, which have been adopted from National Ambient Air Quality Standards, are shown in Table EIS-14. During calendar year 1992, air quality parameters remained below state and Federal standard levels for protection of public health. There have been periods, such as the middle of summer, when short-term violations of the ozone standards have been caused by lack of air movement. However, since attainment is based on a 3-year period, the area is considered to be in total compliance with the ozone as well as all other standards. Air quality is expected to remain good, with the exception of temporary degradation occurring during periods of adverse weather conditions; i.e., prolonged periods of hot, dry weather.

#### GROUND WATER

92. Practically all of the area's ground water is derived from precipitation and reaches the water table through infiltration and percolation. In general, ground water is relatively free from pollution and nearly constant in quality and temperature. The abundant ground-water resources which underlie the Pearl River Basin are generally of good to excellent quality. Aquifers in the Claiborne Group furnish practically all existing ground-water supplies in the northern third of the Basin. Although the underlying Wilcox Group occupies about 1,000 feet of the freshwater section in that area, it is virtually untapped for water supplies due to its greater depth and the availability of adequate water at more shallow depths. Beds of Miocene age constitute sources of ground-water supplies throughout the southern two-thirds of the Basin and are the only significant sources in about one-half of the Basin.

#### RECREATION

93. Both consumptive and nonconsumptive recreational opportunities are available in the Jackson metropolitan area. However, nonconsumptive activities predominate, with fishing in the Pearl River and its associated oxbow lakes representing the principal consumptive use.

TABLE EIS-14  
NATIONAL AMBIENT AIR QUALITY STANDARDS

Contaminant	Primary <u>a/</u>	Secondary <u>b/</u>
Sulfur Oxides	a. 0.03 parts per million (ppm) annual arithmetic mean	0.5 ppm maximum 3-hour concentration not to be exceeded more than once per year
	b. 0.14 ppm maximum 24-hour concentration not to be exceeded more than once per year	
PM <sub>10</sub>	a. 50 micrograms per cubic meter ( $\mu\text{g}/\text{cu m}$ ) annual arithmetic mean	
	b. 150 $\mu\text{g}/\text{cu m}$ maximum 24-hour concentration not to be exceeded more than once per year	
Carbon Monoxide	a. 9 ppm maximum 8-hour concentration not to be exceeded more than once per year	
	b. 35 ppm maximum 1-hour concentration not to be exceeded more than once per year	
Ozone	0.12 ppm maximum 1-hour concentration with an expected exceedance of no more than 1 day per year based upon a 3-year average	
Nitrogen Oxides	0.053 ppm annual arithmetic mean	
Lead	1.5 $\mu\text{g}/\text{cu m}$ maximum quarterly arithmetic mean	

SOURCE: Mississippi Department of Environmental Quality, Office of Pollution Control.

a/ Primary standards are air quality levels set to protect public health.

b/ Secondary standards are air quality levels set to protect the general welfare.

94. LeFleur's Bluff State Park complex is within the city of Jackson and project area. The Park was originally developed by the city of Jackson primarily for nonconsumptive recreational activities. In 1986, control and management were transferred to the Mississippi Department of Wildlife, Fisheries and Parks. Park complex facilities include a swimming pool, golf course, tennis courts, picnic areas, playgrounds, and hiking trails. The Mayes Lake area, part of the park complex, consists of several ponds and oxbow lakes and camping facilities. It is used extensively for fishing and includes easy access and wooden piers for bank fishermen.

95. Immediately below the Ross Barnett Dam are picnicking facilities and access for fishermen and boaters. In addition, the levees surrounding the Jackson metropolitan area are used by joggers and, to a limited extent, horseback riders.

#### ESTHETIC RESOURCES

96. Much of the area near Jackson in the immediate vicinity of the Pearl River is forested and void of residential, commercial, or industrial development. This greenbelt provides a visually relaxing atmosphere for those persons wishing to escape the highly developed metropolitan area. The remaining nonforested land provides a visual diversity which varies in visual pleasantry depending on specific areas and tastes.

#### ENVIRONMENTAL CONSEQUENCES

##### LAND USE

97. In 1985, over 23 percent of the 38,300-acre study area flood plain was devoted to urban development. Since that time, urban development, primarily residential and commercial development, has continued within the flood plain. The recommended plan would convert approximately 1,024 wooded acres and 481 cleared acres to project features.

##### PRIME FARMLAND

98. SCS indicated that no prime, unique, statewide, or locally important farmlands would be impacted by project construction.

##### WATERFOWL RESOURCES

99. The project area is not a major waterfowl production or wintering area. However, the reduction in forested flood plain would have minor adverse impacts to area wood duck population, which utilize the area year-round. To a lesser extent, migratory waterfowl which utilize the forested flood plain of the project area on a seasonal basis would be adversely impacted.

##### TERRESTRIAL RESOURCES

100. Unavoidable adverse impacts to wildlife species dependent upon forested habitat would result from implementation of the proposed project. Project rights-of-way would require 1,024 forested acres and 481 cleared acres. Approximately 90 percent of the forested acreage is bottom-land hardwood habitat.

101. Based on the terrestrial habitat evaluation, the recommended plan would result in a loss of 3,408 average annual habitat units (AAHU) or 2,648 AAHU's and 3,395 AAHU's for Alternatives A and C, respectively. Habitat Units (HU) are a function of habitat quality (Habitat Suitability Index (HSI) value) and habitat area (acres). One HU represents 1 acre of optimal habitat for a given species of animal. Table EIS-15 summarizes the estimated net impacts to terrestrial resources for each alternative by evaluation species. Evaluation species consisted of the barred owl, brown thrasher, eastern meadowlark, gray squirrel, slider turtle, swamp rabbit, and Carolina chickadee. The barred owl, brown thrasher, gray squirrel, turtle, swamp rabbit, and Carolina chickadee lost AAHU's under each alternative, while the slider turtle and eastern meadowlark gained. This was due to the fact that borrow areas would create turtle habitat and levee rights-of-way would create meadowlark habitat. The recommended alternative would result in estimated AAHU losses of 1,039, 845, 742, 675, and 107, respectively, for the Carolina chickadee, swamp rabbit, barred owl, gray squirrel, and brown thrasher. The recommended alternative would result in an AAHU gain of 465 and 301, respectively, for the Eastern meadowlark and slider turtle. For more specific information about the terrestrial impact evaluation, refer to Appendix 2.

TABLE EIS-15  
ESTIMATED IMPACTS TO TERRESTRIAL HABITAT

Evaluation Species	Alternatives		
	A	B	C
Barred owl	-570	-742	-732
Brown thrasher	-111	-107	-135
Eastern meadowlark	+438	+465	+463
Gray squirrel	-519	-675	-667
Slider turtle	+214	+301	+329
Swamp rabbit	-650	-845	-836
Carolina chickadee	-798	-1,039	-1,025





## WETLAND RESOURCES

102. Adverse impacts to wetlands can result from land use conversion or from altered hydrologic characteristics. Generally, land use conversion results in complete loss of wetlands function, while altering hydrologic characteristics results in partial reduction of function. For the most part, the habitat quality of the Pearl River flood plain in the study area is of lower value than the areas upstream and downstream of the project. This is because the flood plain in the Jackson area has been constricted by previously constructed levees and filling activities; thus, reducing wetland functional values.

103. Direct and adverse impacts to wetland resources would occur under each alternative. As discussed earlier, some direct impacts were avoided, where possible, by environmental design features that have been made a part of the project. Wetland conversion resulting from project construction would total 828 and 1,063 acres, respectively, for Alternatives A and C. The recommended alternative would convert 931 acres of wetlands.

104. A 1990 Memorandum of Agreement (MOA) between the Department of the Army and the Environmental Protection Agency recommends that the sequence of avoidance, minimization, and compensation be used to offset wetland impacts. The MOA recommends that mitigation for wetland impacts requires a 1 to 1 functional replacement. The MOA further recommends a minimum of 1 to 1 acreage replacement in the absence of definitive, quantitative information on wetland functions. The projected mitigation (compensation) for projected terrestrial losses associated with the proposed project significantly exceeds the recommended replacement ratio.

## AQUATIC RESOURCES

105. The recommended alternative would entail 168 acres of overbank clearing, as well as maintaining approximately 74 acres of previously cleared land as open land. This would result in the loss of stable attachment sites for microvertebrates during seasonal flooding. The removal of shade trees along the streambank could result in an increase in water temperature with a corresponding decline in some water quality parameters such as dissolved oxygen. This could reduce the assimilative capacity, adversely impacting aquatic populations. However, the severity of any potential water quality impacts to the aquatic community due to overbank clearing would not be significant considering the volume of flow and the relatively short length of stream involved.

106. Project construction would result in an estimated 40 acres of cypress-tupelo habitat being lost. The severity of the loss of the aquatic resources associated with this habitat would be minimized by the creation of borrow areas. The borrow areas would be constructed employing environmental design measures to enhance their value as an aquatic resource. The vitality and

productivity of these aquatic habitats would also be enhanced by locating them riverward of the levees so that surface runoff rainwater and the cyclic natural periodic inundation of the flood plain can recharge them; i.e., allow the exchange of water, nutrients, and fish communities.

#### THREATENED AND ENDANGERED SPECIES

107. In accordance with Section 7(c) of the Endangered Species Act of 1973, as amended, the Vicksburg District prepared a Biological Assessment (BA) for the ringed sawback turtle (Graptemys oculifera) to address potential impacts to the turtle from implementation of proposed Jackson metropolitan flood control measures. The BA identified suitable basking sites and adequate sandbars for nesting as the factors most limiting to the turtle's well-being. Impacts associated with the proposed project include changes in flood stages and duration of inundation due to constriction of the flood plain by newly constructed levees. The proposed project would affect only those flows with a recurrence interval of 5 years or more. Flows below the top bank of the river would not be affected in duration or frequency. As a result, duration and frequency of water levels on sandbars in the river would not change. Overbank clearing associated with project implementation may remove an area for source of basking. However, since much of the overbank clearing will be in the form of maintenance to existing cleared areas, this impact would likely be insignificant. Changes in river stages resulting from project implementation would be in the form of "spikes" rather than gradual increases. This level of increase would not be functionally different from current releases from the Ross Barnett Reservoir, and therefore, would not likely have a significant adverse impact on the turtle. FWS concurs with the conclusion presented in the Biological Assessment that adverse impacts to the ringed sawback turtle are unlikely as long as nesting beaches and basking areas are not disturbed. A copy of the FWS letter of concurrence can be found in Appendix 1.

#### CULTURAL RESOURCES

108. Sixty-one archeological/historical sites were assessed within the project vicinity. Six of those sites, as well as the Leggett Farm Complex, Byram Bridge, and Woodrow Wilson Bridge, are either potentially eligible for listing in the NRHP or have been listed in the NRHP (Byram and Woodrow Wilson Bridges). All sites eligible or potentially eligible for inclusion in the NRHP would be avoided during construction and subsequent maintenance of the proposed project.

109. Should any cultural resources of potential significance be discovered during construction of the proposed project, work would cease in that area until an archeologist could assess the situation and, if necessary, initiate appropriate consultation in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended. The complete results of the comprehensive cultural resource inventory for the project area are discussed in Appendix 3.

## WATER QUALITY

110. During construction of the levees, all disturbed areas would be subject to increased soil erosion. Eroded material would be transported into small tributary streams and into the Pearl River. Increased sediment loads would result in increases in both suspended solids and turbidity. Increases in suspended solids may result in decreases in dissolved oxygen, decreased light penetration, and decreased photosynthesis. However, these impacts would be short in duration and would diminish once vegetation has reestablished. These impacts would be minimized by seeding disturbed areas as early as possible.

111. The removal of trees and vegetation resulting from land clearing would increase runoff and increase erosion. The likely impacts are the same as those cited in the previous paragraph. Also, these impacts would be short in duration and would diminish once vegetation is reestablished. The impacts would be minimized by seeding disturbed areas as early as possible. Hydrologic and hydraulic analysis indicated that the increase in sediment transport will be insignificant.

## OVERBANK CLEARING

112. Clearing of lands along banks would result in the loss of bank canopy and vegetation. Bank canopy provides shading from extreme temperatures resulting from solar radiation. The removal of this canopy may result in higher temperatures and potential loss in dissolved oxygen. The removal of bank vegetation would increase soil erosion resulting in higher suspended solids and increased turbidity values. Decreases in dissolved oxygen, decreased light penetration, and decreased photosynthesis may occur. The herbaceous growth would return within 1 to 2 years to provide a sediment filtering capability, but it would take 10 to 15 years for the shading to be replaced. These impacts would be minimized by seeding disturbed areas.

## CONTROL STRUCTURES

113. To maintain natural drainage, construction of 18 control structures is proposed. Impacts to water quality resulting from their construction include increases in soil erosion, suspended solids, and turbidities. The clearing of lands for construction and access of the control structures will increase soil erosion and result in increases in suspended solids and turbidities. These impacts would be short in duration and would diminish once vegetation is reestablished. These impacts would be minimized by seeding disturbed areas. Subsequent to construction and reestablishment of vegetation, gravity outlet structures would benefit water quality by controlling drainage into the Pearl River during periods of heavy rainfall. This would allow for deposition of suspended solids, thus decreasing the amount of suspended solids entering the river.

## GROUND WATER

114. The project would not affect ground-water resources.

## RECREATION

115. A comprehensive recreation plan was developed by PRBDD as an integral part of the project (Appendix 6, Exhibits 6-8). The plan consists of a trail system along the levee with day-use areas at strategic locations. The trails would originate in northeast Jackson and extend to the floodwall segment, extend along the Fairgrounds, Town and Lynch Creeks, and South Jackson segments. On the Rankin County side of the Pearl River, the trail would extend along the East Jackson levee and proposed Flowood levee from old U.S. Highway 49 to the vicinity of Airport Road. Additional features to include a boat launch, comfort station, picnic area/pavilion, open play field, amphitheater, and parking area are planned for the island location on Lakeland Drive. The implementation of these recreational features would contribute to meeting urban recreational use demands in a manner compatible with private lands adjacent to the river and potential significant changes in river stages.

## ESTHETIC RESOURCES

116. Project implementation would necessitate the removal of both trees and herbaceous vegetation during construction. This unavoidable loss of greenbelt would degrade the area's esthetic value. The esthetic degradation would be ameliorated after construction by reseeding disturbed areas. In addition, there would be some landscaping associated with recreational areas, while others would be allowed to reforest naturally.

## MITIGATION (COMPENSATION)

117. Compensation for unavoidable adverse project impacts requires the acquisition and reforestation of 1,228 acres of marginal farmland. In accordance with Section 906(a)(1) of the Water Resources Development Act of 1986, mitigation lands would be acquired concurrently with lands and interests for project purposes. While the location of potential lands has not been identified, selection would be based on a priority matrix and landowner surveys. The priority matrix considers drainage basin location, existing land use, land rehabilitation methods, and specific location. Land acquired for mitigation would be exempt from taxes. However, removal of marginal farmland from agricultural production would not cause significant adverse impacts to farm employment or related farm support operations and/or businesses. If the compensation land is Federally owned, the county in which the land is located would receive a portion of the receipts from the sale of any products; e.g., timber, associated with the land. Whether the land is Federally, state, or locally owned, any increase in public use on the area by hunters, wildlife photographers, or others would impact favorably on the local economy of the area, since much of the needed supplies and equipment would be purchased locally.

## SECTION 122 ITEMS

118. The 1970 River and Harbors Act (Public Law 91-611), Section 122, requires impacts on the following items to be addressed.

### NOISE

119. Construction and maintenance of any of the structural alternatives would cause temporarily elevated background noise levels because of the equipment used. Due to the temporary nature of the disruption, there would not be any significant effect upon the Jackson metropolitan area. Also, since most of the area is highly developed, elevated noise levels from construction would not result in a significant disruption to the area's activities.

### DISPLACEMENT OF PEOPLE

120. The project would reduce urban flooding and the associated financial hardships. None of the alternatives would result in the displacement of residential households.

### ESTHETIC VALUES

121. Refer to the Affected Environment and Environmental Consequences sections.

### COMMUNITY COHESION

122. All of the structural alternatives would contribute significantly to community cohesion by providing protection against certain levels of potential flooding. This would contribute directly to the stability of the area's economy and lifestyles of people living in the Jackson area.

### LOCAL GOVERNMENT FINANCE, TAX REVENUES, AND PROPERTY VALUES

123. Local government finance considers tax bases, property values, and tax revenues. These items impact the financial condition of local governmental units and often determine the level and quality of necessary local public services. Public revenues and expenditures would not be significantly affected. Project implementation would generate net positive benefits for the governmental sector.

### PROPERTY VALUES

124. Property values would likely rise due to reduced flood risks, subsequent to project implementation.



## DISPLACEMENT OF BUSINESS

125. Implementation of the proposed project would require the acquisition and displacement of 32 commercial facilities on Lakeland Drive between the northeast Jackson and Flowood levee segments. Also, three facilities in the Richland levee segment area would be displaced.

## PUBLIC SERVICES AND FACILITIES

126. Local governments provide basic public services including education, police protection, various county social welfare services, and road and bridge maintenance. Flood protection would improve the ability of local governments to provide and maintain public services and facilities.

## COMMUNITY AND REGIONAL GROWTH

127. The project would benefit community and regional growth in the Jackson metropolitan area by reducing the potential for flooding. This would contribute to area stability and growth.

## EMPLOYMENT

128. Construction, operation, and maintenance of the project would have a short-term positive impact on employment. However, long-term employment trends in the area would not be significantly impacted.

## AIR QUALITY

129. The project would not affect long-term air quality.

## RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF SOCIETY'S ENVIRONMENT AND THE MAINTENANCE OF LONG-TERM PRODUCTIVITY

130. Flood control benefits and adverse environmental impacts represent tradeoffs between the local short-term use and the long-term stability and productivity of society's environment.

131. The project would reduce urban flooding and its associated financial and psychological hardships. Flood protection would improve the ability of local governments to provide and maintain public services, including education, police protection, road and bridge maintenance, and various other social services. The stability of the area is based on the continuation of an urban economy. Flood reduction in the area would aid the continued existence of this economy and reduce the fragmentation and duress associated with major flood events on the community. These benefits, however, will produce some adverse impacts to the natural environment.



132. Project construction would entail converting 481 acres of open land and 1,024 acres of forested land to project features. Conversions of forested land would have long-term adverse impacts to terrestrial wildlife and wetland functional value. However, these impacts would be compensated concurrently with project construction. Acreage involved in compensation would be dedicated in perpetuity. This would contribute to the long-term stability and productivity of wildlife resources and society's environment.

ANY IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES  
INVOLVED IN THE PROPOSED ACTION SHOULD IT BE IMPLEMENTED

133. Project implementation would irreversibly and irretrievably commit lands and associated resources for the life of the project. It also would commit labor and material, planning and technical expertise, and monetary resources.

U.S. FISH AND WILDLIFE SERVICE RECOMMENDATIONS

134. In accordance with the Fish and Wildlife Coordination Act of 1958, as amended, FWS provided planning input (see Appendix 7) and developed the following recommendations to minimize the adverse impacts of the project.

a. Mitigate for unavoidable losses of wildlife habitat, as reflected by loss of AAHU's, by rehabilitating degrading wetlands. Mitigation should occur concurrently with construction of the project. Acreage will be determined by an HEP analysis on the proposed mitigation site. The mitigation site should be selected using the criteria found in Table 4 of the Fish and Wildlife Coordination Act Report.

b. Design borrow pits to improve fish and wildlife habitat as described in the Corps 1986 report, "Environmental Design Considerations for Main Stem Levee Borrow Areas along the Lower Mississippi River."

c. Incorporate sediment and erosion control measures during construction of the levees and vegetate all disturbed areas.

d. Monitor sandbars in the Pearl River to determine net changes in size and availability during nesting season for the ringed sawback turtle as affected by changes in hydrology of the river. This could be accomplished by remote sensing, field inspection, or river gage data obtained just prior to nesting season (April-May) and following nesting season (August-September) for the first 20 years of the life of the project.

e. Limit the use of herbicides in the maintenance of the overbank and floodway clearing areas to those specifically developed for use adjacent to open water.

f. Limit the removal of vegetation on the project area to that necessary for the flood control features of the project. This also includes maintenance activities for the project.

g. Restrictive use zoning or nondevelopment easements should be implemented by the local sponsor prior to project construction and contain language stringent enough to ensure that flood-prone development does not occur and that undeveloped lands in the flood plain are used for floodwater storage, wildlife, outdoor recreation, and other flood sensitive land uses.

135. The Corps concurs in these recommended measures.

#### LIST OF PREPARERS

136. A list of preparers is depicted in Table EIS-16.

#### PUBLIC INVOLVEMENT

137. A Notice of Intent to prepare a draft EIS was published in the Federal Register on 26 November 1991. A public scoping meeting was held in Jackson on 26 March 1992. In addition to advertising in newspapers of local and state-wide circulation, persons and/or agencies and organizations known to have an interest in the project were mailed notices of the meeting. Excluding Corps and cooperating agency personnel, 51 people attended the meeting.

138. The scoping process determined the range and significance of issues. Issues raised during the scoping process included:

a. Group 1.

Status of area flooded in 1979 with new levees in place.

Will discharge of 1979 flood be completely contained inside new levees?

What discharge rate out of the reservoir compares with what the new levee system will handle.

Will project be coordinated with all applicable agencies?

Will project be coordinated with EPA?

Could Ross Barnett be used as an effective flood control facility?

TABLE EIS-16  
LIST OF PREPARERS

Name	Discipline/Expertise	Experience	Role in Preparing EIS
Mr. Bob Barry	Biology	2 years, Environmental Resources Branch, Planning Division, U.S. Army Engineer District, Vicksburg	HEP evaluation
Mr. John Britt	Archeology	Environmental Resources Branch, Planning Division, U.S. Army Engineer District, Vicksburg	Cultural Resources Appendix
Dr. John Burris (Retired)	Ecology	Formerly with the Mississippi Department of Fisheries, Wildlife and Parks	HEP evaluation
Mr. Robert Fitzgerald	Hydrology/Hydraulic Engineering	15 years, Hydraulics Branch, Engineering Division, U.S. Army Engineer District, Vicksburg	Hydrology
Ms. Marge Harney	Fish and Wildlife Biology	23 years, Ecological Services Division, U.S. Fish and Wildlife Service	HEP evaluation
Mr. Wendell King	Biology	14 years, Environmental Resources Branch, Planning Division, U.S. Army Engineer District, Vicksburg	Project biologist
Ms. Kathy Lunceford	Fish and Wildlife Biology	2 years, Ecological Services Division, U.S. Fish and Wildlife Service; 2 years U.S. Army Corps of Engineers	Fish and Wildlife Coordination Act Report
Mr. Steve Reed	Supervisory Biologist	19 years, Environmental Resources Branch, Planning Division, U.S. Army Engineer District, Vicksburg	National Environmental Protection Act compliance
Mr. Greg Ruff	Civil Engineer	16 years, Plan Formulation Branch, U.S. Army Engineer District, Vicksburg	Study manager
Mr. David Wallace	Environmental Engineering	4 years, Water Quality Section, Hydraulics Branch, Engineering Division, U.S. Army Engineer District, Vicksburg	Water quality
Mr. Rayford Wilbanks	Regional Economist	13 years, Economic and Social Analysis Branch, Planning Division, U.S. Army Engineer District, Vicksburg	Economic analysis
Mr. Gary Young	Biology/Forestry	3 years, Environmental Resources Branch, Planning Division, U.S. Army Engineer District, Vicksburg	HEP evaluation

What will happen to drainage with new levees?

What will happen to backwater flooding such as Town Creek, etc., with levees?

What will be the impacts to Crystal Lake?

What about hydraulic effects to areas such as Purple Creek?

Does this affect the airport?

Would hydraulic data still be good with Lakeland Drive filling over the years?

Mitigation of significant environmental resources?

Where is material going to come from to construct upper portion of west bank levee?

How long will it be before the levees are constructed?

b. Group 2.

Town Creek area flood control.

Concerned about slow pace of study.

How will hydrology downstream be affected?

Consider opening channel downstream of Jackson to increase flow.

Build levees on both sides of river.

Modify Lakeland Drive bridges to increase flow. Also, highway bridges (I-55 and I-20).

Setback fairground levees.

Build present levees higher (borrow to come from side of river)?

c. Group 3.

Wetlands, regulation, no net loss.

Recreation, fishing loss.

Long-term value, Eastover Subdivision.

Mayes Lake.

Upstream impact of project people--environment, changes to 100-year flood plain.

Comprehensive land-use plan required Pearl River Basin enforcement--Madison County.

Concurrent funded mitigation.

Outdoor recreation opportunities.

Full National Environmental Policy Act (NEPA) compliance.

Downstream water quality/impacts.

Multipurpose use of improvements.

General impacts to wildlife and fisheries habitat.

Aquifer.

Where is mitigation going to occur?

Impact of recreational use on adjoining property. No recreational use.

No need for additional recreation.

Pollution impacts.

Need to know who's in charge of completed project. Enforcement.

Who's in charge and paying for maintenance of levee and environmental impacts.

Liability for recreational users.

Filling in and building causing more flooding.

Caney Creek needs to be widened; beaver control, Suncrest and Cooper Roads (between) below Highway 80.

Development behind levees change in land-use caused by project.

Project affects on existing residence (Caney Creek), streambank stabilization.

Not for project, no guarantee about effects on other people.

Nonpoint source pollution. How to address?

Hazardous waste--will it affect project area? Concerns about past waste disposal in project area.

Will project address rising and falling water from Ross Barnett? Control of river stages, affect on bank stabilization, fish kill as a result?

Will adjoining property owners pay for project through higher taxes or will the tax burden be fairly distributed?

Will project include consideration for bridges and other structures besides land issues?

Pollution effects on sewer systems.

Will river be allowed to flow normally during low flows?

Legality of changing flows.

d. Group 4.

Effect of flood on property tax base (future), property values, and housing costs. Will values increase in project area?

Recreation

Levees

Corridor (river)

Circulation/Transportation

Roads (3) trails (bike, jogging)

Walks (4) reservoir access

Police Patrol

Commercial Development

Marina

Water-based Recreation

Interpretive

Archeology/Anthropology

Urban River Development

Tourism



#### Cultural Resources

Indian Mound near Purple Creek

Civil War Sites

Commercial (historic) Trade Routes

#### Natural Resources

Visual Impact Analysis of Channel Clearing

Impact on Fish and Wildlife (Channel Clearing)

Overall Impact on Fish and Wildlife

Relationship of the Levee Design and Construction on Natural Resources

How wide is Levee Construction Area?

#### Maintenance of Project

How much money will be required to maintain the levees?

Will the area between the levee and the river channel be cleared?  
If so, how often?

Will the area be reforested?

Who will be responsible for maintenance of the entire project?

How much will it cost?

Project is a part of two counties and four metropolitan areas and PRBDD, levee board, and CMPDD.

#### Flood Control

Will it work?

Water level between the inside of levees? Will it be a reservoir?  
Ponded, etc.

Will other water control structures be needed below Ross Barnett  
to maintain these levees, if any?

What about deepening Ross Barnett and dredging the river channel above for additional ponding capacity? Evaluate using Ross Barnett for flood control.

Will the project eliminate feeder creek flooding or create more of same?

Evaluate contingency plans for feeder creeks.

Will future development within flood plains be regulated to minimize impact on wildlife and natural resources?

Will continued development make this project inadequate for future flooding (outside levees)?

Will current legislation be changed to allow development of property along the levee?

Will present construction be regulated during the project design stages?

#### Natural Resources

##### Wildlife

How big levees and how will it impact wildlife in the urban area? Will the game be relocated? Will a permanent conservation area or preserve be a part of this project?

Any endangered species, other than "sawback turtle" in the project area? Sandhill crane?

What impact on breeding habitats?

Will the ponding associated with the project be designed to enhance fish and wildlife habitat.

Will there be any control of the movement of wildlife from one side of the levee to the other?

##### Wetlands

How will wetlands be affected by the construction of the levees?

Alternatives for restoring present wetlands.

Purchase of property in unaffected areas.

Restoring them inside the levees.

Timber

Habitat Changes

Hazardous waste evaluation

Property

Taxes

Values

Acquisition of lands, how many acres, etc?

Land planning

Other

Water supply; how will the project affect the communities' water supplies and quality?

Any sewage or storm water runoff into the project area.

Sewer

Storm

Industrial

Agricultural

Will the report be made public?

#### COOPERATING AGENCIES

139. FWS; Mississippi Department of Wildlife, Fisheries and Parks; EPA; and PRBDD served as cooperating agencies. Cooperating agencies assisted in the development and preparation of the environmental analysis, resource documentation, and the EIS. Contributions included:

- a. NEPA and scoping participation.
- b. Professional expertise, study direction, and technical analysis.
- c. Terrestrial Habitat Evaluation Procedures participation.
- d. Recreation, cultural resources, environmental design, and HTRW studies.

- e. Meeting and field trip participation.
- f. Document and technical appendixes review.

#### COORDINATION AND REVIEW

140. Extensive coordination activities, including letters, interagency meetings, field trips, public presentations, and meetings were conducted during the course of this study. The draft EIS will be sent for review and comment (45 days) to the following agencies, organizations, groups, and persons.

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# JACKSON METROPOLITAN AREA, MISSISSIPPI

## APPENDIX 1 COORDINATION





This appendix will  
contain the results of  
coordination of the draft  
report following public  
review.



# JACKSON METROPOLITAN AREA, MISSISSIPPI

## APPENDIX 2

### AN EVALUATION OF IMPACTS TO TERRESTRIAL HABITATS RESULTING FROM LEVEE CONSTRUCTION (2-A)

### MITIGATION PLAN (2-B)